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$$(216-2A)a=200x,$$
$$A=88,\ B=128.$$

When weight of table is considered $A=104$, $B=144$, $C=0$.
Summing up these results,

with weight at F'................$A=15$, $B=113$, $C=72$.
" " " P' (neglecting G) $A=88$, $B=128$, $C=-16$.
" " " F'' (considering G) $A=104$, $B=144$, $C=0$.

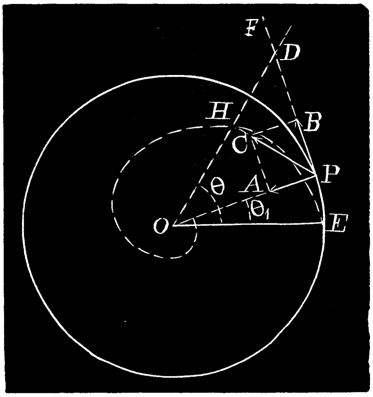
4. **Proposed by DeVOLSON WOOD, M. A., C. E., Professor of Mechanical Engineering, Stevens Institute of Technology, Hoboken, New Jersey.**

A particle starts at rest and revolves in a circle with a uniform acceleration, acquiring a velocity v in t seconds. Find the locus of the foot of the perpendicular from the centre of the circle upon the resultant acceleration.

A graphical solution by ALFRED HUME, C. E., D. Sc., Professor of Mathematics in the University of Mississippi.

CONSTRUCTION OF LOCUS.

Let the particle start from rest at E arriving at any point P in time, t, with velocity v. Let PB, PA, and PC be respectively the tangential, radial, and resultant, accelerations.



Then $PB=\frac{v}{t}$, $PA=\frac{v^2}{R}$ (numerically), and, since the acceleration in the circular path is uniform, arc $PE=\frac{1}{2}vt$.

Now, drawing OH perpendicular to PC and denoting angles HOE and POE by θ and θ_1 respectively, arc $PE=R\theta_1=\frac{1}{2}vt$, and

$$\tan(\theta-\theta_1)=\tan CPB=\frac{BC}{BP}=\frac{v^2}{R}\cdot\frac{t}{v}=\frac{vt}{R}$$
$$=\frac{2R\theta_1}{R}=2\theta_1.$$

Therefore $PD=2$ arc PE, D being the intersection of PB and OH, both produced.

Hence the construction:—To find the point on required locus corresponding to P, any position of the particle, lay off on the tangent PF a distance PD equal to twice the arc PE; connect D with the center of the circle O; from P drop a perpendicular to OD meeting OD at H. H is the point required.

II. **Solution by E. C. MURPHY, C. E., University of Kansas, Lawrence, Kansas.**

Let Fig. 1 represent a circle of radius R on the circumference of which a particle is moving with a unform acceleration p, having started from rest at E. Let P be the position of the particle after time t when its velocity is V and its normal acceleration is $\frac{V^2}{R}$.

Let ρ be the perpendicular dropped from the center of the circle on the resultant acceleration PC; α=the angle OPC and PA,the normal acceleration.

Then from the Fig. we have

$$\rho=R\sin\alpha\ldots.(1).$$

From the triangle APC we have

$$\cos\alpha=\frac{AP}{PC}=\frac{V^2}{pR} \text{ or } \alpha=\cos^{-1}\left(\frac{V^2}{pR}\right)\ldots.(2).$$

$$p=\frac{dV}{dt} \text{ or } dV=\rho dt.$$

$$\int_0^V dV=p\int_0^t dt \text{ or } V=p\mathrm{t}\ldots.(3).$$

Substituting for V its value in (2) and for α its value in (1) we have

$$\rho=R\sin\left[\cos^{-1}\left(\frac{pt^2}{R}\right)\right]\ldots.(4).$$

$\rho=0$ and the direction of the resultant acceleration is through the center of circle when

$$\cos^{-1}\left(\frac{pt^2}{R}\right)=1 \text{ or when } t=\sqrt{\frac{R}{p}}\,.$$

If it is the tangential acceleration which is constant and=p, then

$$\rho=R\sin\left[\tan^{-1}\left(\frac{pt^2}{R}\right)\right]\ldots.(5).$$

PROBLEMS.

11. Proposed by CHARLES E. MYERS, Canton, Ohio.

"A homogeneous sphere moves down a rough inclined plane, whose angle of inclination θ to the horizon is greater than that of the angle of friction; if the coefficient of friction is less than $\frac{2}{7}$ tang. θ, show that the sphere will roll and slide down the inclined plane."

12. Proposed by J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.

A horizontal plane without weight is supported on three points A, B, C. A weight W is laid upon the table at a point G. If $AG=a$, $BG=b$, $CG=c$, $\angle AGB=\beta$, $\angle AGC,=\gamma$; find the pressures upon A, B, C.

Solutions to these problems should be received on or before July 1st.

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